Racial and Ethnic Disparities in Influenza Vaccination Among Elderly Adults

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OBJECTIVES: To examine whether access to care factors account for racial/ethnic disparities in influenza vaccination among elderly adults in the United States.

DESIGN: Indicators of access to care (predisposing, enabling, environmental/system, and health need) derived from Andersen's behavioral model were identified in the National Health Interview Survey questionnaire. The relationship of these indicators to influenza vaccination and race/ethnicity was assessed with multiple logistic regression models.

MAIN RESULTS: Significant differences in vaccination were observed between non-Hispanic (NH) whites (66%) and Hispanics (50%, $P<.001$) and between NH whites (66%) and NH blacks (46%, $P<.001$). Controlling for predisposing and enabling access to care indicators, education, marital status, regular source of care, and number of doctor visits, reduced the prevalence odds ratios (POR) comparing Hispanics to non-Hispanic whites from 1.89 to 1.27. For NH blacks, controlling for access to care indicators changed the POR only from 2.24 (95% CI, 1.9 to 2.7) to 1.93 (95% CI, 1.6 to 2.4).

CONCLUSIONS: This study confirmed the existence of sizable racial/ethnic differences in influenza vaccination among elderly adults. These disparities were only partially explained by differences in indicators of access to care, especially among non-Hispanic blacks for whom large disparities remained. Factors not available in the National Health Interview Survey, such as patient attitudes and provider performance, should be investigated as possible explanations for the racial/ethnic disparity in influenza vaccination among non-Hispanic blacks.

KEY WORDS: influenza vaccine; adult immunization; access to care; elderly; ethnicity.
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Influenza is one of the leading causes of respiratory infections and, together with pneumonia, is the fifth leading cause of death in the United States among the elderly, defined here as persons 65 years and older.[1–3] During severe winter epidemics, influenza causes an average of 20,000 deaths and more than 110,000 hospitalizations.[4,5] Immunization with an inactivated influenza vaccine is a cost-effective strategy to reduce the impact of influenza, especially for persons at increased risk for influenza-related complications due to advanced age or underlying medical conditions.[6–8] However, despite compelling evidence regarding its benefits, influenza vaccine is underutilized, particularly by minorities.[9] Reported 1997 rates of influenza vaccination in the United States among the elderly were 45% for non-Hispanic (NH) blacks and 53% for Hispanics, compared to 65% for NH whites.[9] Although many factors have been found to influence access to health services for adults, the factors that might explain racial/ethnic disparities in influenza vaccination among the elderly remain unclear.

One area that has received minimal attention is the extent to which the observed differences in vaccination coverage can be explained by differences in access to care. One study suggested that access to care factors explain only a portion of the vaccination disparity among a group of adults 18 to 64 years of age with and without indications for influenza vaccination, but similar studies have not been conducted among the elderly.[10]

The purpose of this study was to examine the extent to which access to care indicators explain racial/ethnic disparities in influenza vaccination among the elderly. We use the behavioral model developed by Ronald Andersen as our conceptual framework.[11] According to Andersen's behavioral model, access to and use of health services are determined by selected predisposing, enabling, environmental/system, and need characteristics of the population under study.[11] Predisposing characteristics include demographic (e.g., age, gender, marital status, language proficiency, race), social structure (e.g., employment, education), and health beliefs factors (e.g., attitude toward medical care and disease) that provide the rationale for the utilization of health services. Enabling characteristics are personal, familial, or community resources (e.g., income or health insurance) that allow the consumption of health services. Environmental and health services system characteristics are societal determinants of utilization of health care. Factors such as long waiting times at providers, unavailability of appointments, and inconvenient clinic hours are included in this last domain. Health need characteristics (e.g., health status), perceived or evaluated, directly motivate the use of health services. We hypothesized that these access to care characteristics collectively contribute to the likelihood of the elderly being vaccinated and accounted for a substantial portion of the racial/ethnic disparity in influenza vaccination.

METHODS

Data Source and Study Population

Data from the adult component of the 1998 National Health Interview Survey (NHIS) were analyzed. The NHIS is an annual cross-sectional household survey of the civilian noninstitutionalized population of the United States.[12] The survey uses a complex sampling design employing stratification, clustering,

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and oversampling of NH blacks and Hispanics. The subset of interest for the present analysis was 6,334 elderly respondents, representing a weighted population of 32,220,211 elderly adults in the United States.

Measures

The outcome of interest for this study is self-reported influenza vaccination in the past 12 months. Influenza vaccination was ascertained by the question: "During the past 12 months, have you had a flu shot? A flu shot is usually given in the fall and protects against influenza for the flu season." Race/ethnicity was the explanatory variable of interest and was analyzed separately from the other predisposing variables. Only persons self-identified as Hispanics (regardless of race), NH blacks, and NH whites were included in the analysis. Other races/ethnicities were excluded due to small sample sizes. Independent variables included Andersen's access to care variables (predisposing, enabling, environmental/system, and need) available in the NHIS and 2 additional independent variables, referred to here as covariates: region of residence and living in a metropolitan statistical area (MSA).

Predisposing variables in this study were age, gender, education, marital status, language proficiency, and being a recent immigrant to the United States. Employment was not included in this analysis because only 10% of the respondents were employed, and it was difficult to interpret as a marker for access to care among the elderly. Enabling variables analyzed were annual household income, insurance status, regular source of care, care delayed due to cost barrier, and number of doctor visits in the past 12 months. Environmental/system variables were reported difficulties obtaining appointments, telephone access difficulties, long waits at provider offices, inconvenient clinic hours, and transportation problems. Health need variables were perceived health status and self-report of 1 or more chronic diseases that are indications for influenza vaccination.

Variable Definitions

Age was dichotomized as 65–74 years of age or 75 years and older. Marital status was dichotomized, and those unmarried or living alone were compared with adults married or with a partner. The variable "recent immigrant" was created to identify adults who reported that they were born outside the United States and had lived here 10 years or less. Language proficiency indicates the ability to conduct the interview in English. The insurance status variable had 4 levels: 1) no insurance, 2) public insurance only (Medicare and/or Medicaid), 3) private insurance and Medicare, or 4) unknown status. The variable "care delayed due to cost barrier" was created to represent persons who reported delayed care because they could not afford it or worried about its cost. The "chronic conditions" variable included self-report of having been told in the previous 12 months of 1 or more of the followings conditions considered indications for influenza vaccination for this analysis: heart disease (including angina pectoris, myocardial infarction, and other heart conditions), emphysema, asthma, cancer diagnosed within the previous year, diabetes, chronic bronchitis, kidney failure, and liver conditions.

Statistical Analysis

Separate analyses were conducted for Hispanics and non-Hispanic blacks and 95% confidence intervals (CI) were estimated within each racial/ethnic group. Univariate and bivariate analyses were conducted to assess missing values, check model assumptions, and guide multivariable analyses. Prevalence odds ratios (POR) and associated CIs for the unadjusted association between lack of vaccination and each independent variable were computed. With NH whites as the reference category, multivariate analyses were conducted to assess the relationship between race/ethnicity and lack of influenza vaccine, controlling for independent variables. Independent variables were first entered into logistic regression models in groups, beginning with race/ethnicity, region of residence, and residence in an MSA. The remaining partially adjusted logistic models included race/ethnicity and 1 or more dimension of access to care (predisposing, enabling, environmental/system, and need). Finally, all independent variables were forced into a fully adjusted regression model that included all access to care variables and covariates.

To assess changes in the parameter estimates for race/ethnicity, partially and fully adjusted PORs for race/ethnicity were compared to the crude POR. When a change of 10% or more for the POR was observed as a result of controlling for an access to care dimension, we used a forward selection procedure to assess which of the variables was responsible for the change. First, individual variables from the group in question were added to the crude model 1 at a time, retaining only those that changed the POR for race/ethnicity by 10% or more. When this process was completed, the variables not retained were reentered into the model and the POR examined. This process continued until all variables that produced a change in the POR for race/ethnicity were included in the model.[13] Interaction terms were used to assess potential effect modification between race/ethnicity and each of the significant access to care variables in the final adjusted model. All analyses used weighted data and were conducted using SAS-callable SUDAAN (SAS Institute, Cary, NC; Research Triangle Institute, Research Triangle Park, NC).[14,15]

Results

The majority of elderly subjects reported being married or with a partner, having an income above $20,000, and residing in an MSA (Table 1). One third of elderly adults had less than high school education, and one third had completed college. There were striking differences in the distribution of predisposing and enabling characteristics by race/ethnicity. A much smaller proportion of Hispanics (16%) and NH blacks (23%) had only completed high school than had NH whites (38%). Proportionately more NH blacks were unmarried or lived alone (65%) or had a low income (64%) than did the other racial/ethnic groups. Not surprisingly, only 57% of elderly Hispanics completed the interview in English. Four percent of elderly Hispanics reported being uninsured, compared to less than 1% of NH blacks and NH whites. A greater proportion of whites had private and Medicare insurance (74%) than did Hispanics (30%) and blacks (43%). More NH whites (42%) reported being in excellent or very good health compared to Hispanics (30%) and NH blacks (22%) (Table 2).

Table 1. Distribution of Predisposing and Enabling Access to Care Variables Among Adults Aged 65 Years and Older by Race/Ethnicity—1998 National Health Interview Survey

	Hispanics (n=532)	Non-Hispanic Blacks (n=668)	Non-Hispanic Whites (n=4,934)	Total (N=6,134)
	%	%	%	%
Predisposing variables				
Age group, y				
65–74	65.3	60.7	54.8	55.9
75+	34.7	39.3	45.2	44.1
Male gender	42.3	39.5	42.4	42.2
Education				
Less than high school	67.8	56.3	28.8	33.0
High school graduate	15.6	22.8	38.1	34.0
College or more	16.6	20.9	35.1	33.0
Unmarried/living alone	48.1	64.5	41.7	43.9
Not proficient in English	42.9	0.0	0.3	2.6
Recent immigrant	4.8	0.1	0.4	0.6
Enabling variables				
Insurance status				
Private/Medicare	30.0	43.3	73.6	68.7
Public only	64.0	54.9	25.2	29.7
Uninsured	3.8	0.7	0.3	0.6
Unknown	2.2	1.1	0.9	1.0
No regular source of care	5.3	4.4	3.7	3.9
Household income				
Under $20,000	58.2	64.2	37.3	40.7
$20,000 or more	41.8	35.8	62.7	59.3
Care delayed due to cost barrier	6.0	6.5	3.6	4.0
Number of doctor's visits				
None	12.1	8.0	7.7	8.0
1–3	37.2	34.5	35.2	35.3
4+	50.7	57.5	57.0	56.7

Prevalence of Influenza Vaccination and Coverage Differences

The overall influenza vaccination coverage rate among elderly adults was 63.2% (95% CI, 61.7 to 64.6). A higher proportion of NH whites reported having received influenza vaccine (65.6%; 95% CI, 64.1 to 67.1) than did Hispanics (50.3%; 95% CI, 45.3 to 55.3) and NH blacks (45.9%; CI, 41.6 to 50.3). The prevalence differences were 19.6 percentage points (95% CI, 15.2 to 24.2) for NH blacks and 15.3 percentage points (95% CI, 10.0 to 20.5) for Hispanics.

Table 2. Distribution of Environmental/System and Need Access to Care Variables and Other Covariates Among Adults Aged 65 Years and Older by Race/Ethnicity—1998 National Health Interview Survey

	Hispanics (n=532)	Non-Hispanic Blacks (n=668)	Non-Hispanic Whites (n=4,934)	Total (N=6,134)
	%	%	%	%
Environmental/system variables				
Difficulties obtaining appointments	2.6	2.6	3.3	3.2
Phone access difficulties	1.2	0.9	1.3	1.3
Long wait at providers	4.5	2.1	3.0	3.0
Inconvenient clinic hours	1.2	1.4	1.0	1.0
Transportation problems	2.4	3.1	1.7	1.8
Need variables				
Health status				
Poor	10.8	11.7	6.3	7.0
Fair	26.0	26.8	17.8	19.0
Good	33.0	39.1	34.0	34.4
Excellent/very good	30.2	22.4	41.9	39.6
Chronic conditions	37.2	44.9	41.9	41.9
Other covariates				
Region of residence				
Midwest	4.2	18.7	26.5	24.6
South	39.6	58.0	33.7	36.0
West	40.2	7.9	17.6	18.0
Northeast	16.0	15.5	22.3	21.4
Residence in an MSA	90.2	80.7	74.9	76.3

MSA, metropolitan statistical area.

Unadjusted Analyses

Crude POR for lack of vaccination were 1.89 (95% CI, 1.5 to 2.3) for Hispanics and 2.24 (95% CI, 1.9 to 2.7) for NH blacks. Predisposing characteristics most strongly associated with lack of vaccination among NH whites included being in the age group 65–74 years, being unmarried or living alone, being a recent immigrant, and lacking English language proficiency (Table 3). Borderline or no associations were observed with gender, education, and unmarried/living alone among Hispanics and NH blacks. In all 3 racial/ethnic groups, being uninsured, lack of a regular place for care, and having no doctor's visits in the last 12 months were the enabling characteristics most strongly associated with lack of vaccination. Weaker associations were observed with care delayed because of cost barrier, having 1–3 doctor visits in the last 12 months, and reporting a household income below $20,000. No environmental/system and need variables were found to be associated with lack of vaccination (Table 4).

Multivariate Analyses

The logistic regression analyses examined the collective effect of access variables on the racial/ethnic disparity in influenza vaccination observed among elderly adults (Table 5). Both predisposing and enabling variables, but not environmental, need, or other covariates, affected the estimate for the racial/ethnic disparity in influenza vaccination. Adding sets of predisposing and enabling variables to the crude model decreased the POR comparing Hispanics to NH whites from 1.89 (crude) to as low as 1.27, and the POR comparing NH blacks to NH whites from 2.24 (crude) to as low as 1.93. The access to care variables that accounted for the reduction in the racial/ethnic gap were age, education, marital status, and language proficiency in the predisposing domain and insurance status, regular place for care, and number of doctor's visits in the enabling domain. Adding these variables to the crude model reduced the POR comparing Hispanics to NH whites by a relative 32% and the POR comparing NH blacks to NH whites by a relative 12%. No significant ($P<.05$) interactions between race/ethnicity and any of these variables were present.

DISCUSSION

Our study used a large nationally representative sample of elderly adults to assess, for the first time, racial/ethnic disparities in influenza vaccination after controlling multiple indicators of access to care. This study confirmed the existence of sizable racial/ethnic differences in influenza vaccination among elderly adults.[9,16] These disparities were only partially explained by differences in indicators of access to care.

In our study, the factors responsible for the reduction in the racial/ethnic vaccination disparity were age, education, marital status, English language proficiency, insurance status, having a regular source for care, and number of physician visits. These results extend prior observations identifying access indicators as important determinants of adult use of preventive services, including vaccinations.[16–18] A person with better education and English language proficiency is expected to be more knowledgeable about vaccines and more likely to have the means to obtain them. Married elderly are more likely to have social support, which may encourage and facilitate obtaining medical services.[19] Controlling for these predisposing and enabling factors reduced the racial/ethnic disparity between Hispanics and NH whites by a third, but decreased the vaccination gap between NH blacks and NH whites only slightly.

Table 3. Unadjusted Prevalence Odds Ratios and 95% Confidence Limits for the Association Between Lack of Vaccination and Predisposing and Enabling Access to Care Variables Among Adults Aged 65 Years and Older by Race/Ethnicity—1998 National Health Interview Survey

	Hispanics		Non-Hispanic Blacks		Non-Hispanic Whites	
	POR	95% CI	POR	95% CI	POR	95% CI
Predisposing variables						
Age group, y						
65–74	1.16	(0.8 to 1.8)	1.48	(1.0 to 2.1)	1.34	(1.2 to 1.5)
75+	1.00	(reference)	1.00	(reference)	1.00	(reference)
Male gender	1.03	(0.7 to 1.5)	1.15	(0.8 to 1.7)	0.96	(0.8 to 1.1)
Education						
Less than high school	1.18	(0.7 to 2.0)	1.21	(0.8 to 1.8)	1.36	(1.1 to 1.6)
High school graduate	1.23	(0.6 to 2.4)	0.98	(0.6 to 1.7)	1.11	(0.9 to 1.3)
College or more	1.00	(reference)	1.00	(reference)	1.00	(reference)
Unmarried/alone	1.26	(1.0 to 13.9)	1.34	(0.9 to 1.9)	1.40	(1.2 to 1.6)
No language proficiency	1.27	(0.8 to 1.9)	n/a		2.34	(0.8 to 6.6)
Recent immigrant to U.S.	3.66	(0.9 to 1.8)	n/a		4.40	(1.5, 12.5)
Enabling variables						
Insurance status						
Private/Medicare	1.00	(reference)	1.00	(reference)	1.00	(reference)
Public only	1.18	(0.7 to 1.9)	1.03	(0.7 to 1.4)	1.43	(1.2 to 1.7)
Uninsured	4.96	(1.4 to 17.3)	3.39	(0.3 to 42.3)	11.01	(2.6 to 47.2)
Unknown	0.12	(0.02 to 0.7)	1.42	(0.3 to 6.9)	0.82	(0.4 to 1.8)
No regular source of care	3.78	(1.4 to 10.1)	3.38	(1.0 to 11.8)	4.78	(3.4 to 6.6)
Household income below $20,000	1.17	(0.7 to 1.9)	0.77	(0.5 to 1.1)	1.34	(1.2 to 1.5)
Care delayed due to cost barrier	1.24	(0.5 to 2.8)	1.07	(0.6 to 2.0)	1.56	(1.2 to 2.1)
Number of doctor's visits						
None	6.41	(2.6 to 15.9)	3.90	(1.8 to 8.5)	5.10	(3.8 to 6.9)
1–3	2.32	(1.3 to 4.0)	1.49	(0.9 to 2.4)	1.44	(1.2 to 1.7)
4+	1.00	(reference)	1.00	(reference)	1.00	(reference)

POR, prevalence odds ratio; n/a, not applicable or sparse data.

Table 4. Unadjusted Prevalence Odds Ratios and 95% Confidence Limits for the Association Between Lack of Vaccination and Environmental/System and Need Access to Care Variables Among Adults Aged 65 Years and Older by Race/Ethnicity—1998 National Health Interview Survey

	Hispanics		Non-Hispanic Blacks		Non-Hispanic Whites	
	POR	95% CI	POR	95% CI	POR	95% CI
Environmental/system variables*						
Difficulties obtaining appointments	0.37	(0.1 to 1.8)	0.81	(0.3 to 2.4)	0.90	(0.6 to 1.3)
Phone access difficulties	0.85	(0.1 to 6.9)	0.86	(0.2 to 4.0)	1.52	(0.8 to 2.8)
Long waits at provider offices	0.55	(0.2 to 1.5)	1.10	(0.4 to 2.8)	0.72	(0.5 to 1.1)
Inconvenient clinic hours	0.51	(0.1 to 2.9)	1.88	(0.4 to 8.5)	1.43	(0.8 to 2.6)
Transportation problems	0.44	(0.1 to 1.3)	1.21	(0.6 to 2.6)	1.35	(0.8 to 2.1)
Need variables						
Self-reported health status						
Poor	n/a		1.09	(0.6 to 2.0)	0.99	(0.7 to 1.3)
Fair	1.43	(0.9 to 4.3)	0.77	(0.5 to 1.2)	0.72	(0.6 to 0.9)
Good	1.97	(0.5 to 4.5)	0.73	(0.5 to 1.1)	0.72	(0.6 to 0.8)
Excellent/very good	1.0	(reference)	1.0	(reference)	1.0	(reference)
Chronic conditions*	0.82	(0.3 to 2.1)	0.85	(0.6 to 1.3)	0.75	(0.6 to 0.9)
Other covariates						
Region of residence						
Midwest	0.51	(0.2 to 1.5)	0.65	(0.4 to 1.1)	0.81	(0.7 to 1.0)
South	0.75	(0.4 to 1.2)	0.65	(0.4 to 1.0)	0.83	(0.7 to 1.0)
West	0.66	(0.4 to 1.1)	0.83	(0.4 to 1.5)	0.76	(0.6 to 0.9)
Northeast	1.0	(reference)	1.0	(reference)	1.0	(reference)
Residence in an MSA*	0.9	(0.5 to 1.1)	0.92	(0.5 to 1.6)	1.04	(0.9 to 1.2)

**Reference level = "no."*
POR, prevalence odds ratio; MSA, metropolitan statistical area; n/a, not applicable or sparse data.

We expected a significant reduction in the vaccination disparity for both ethnic minority groups after controlling for access to care. However, accounting for the sociodemographic and economic dimensions of access to care had only a small effect on the vaccination disparity between NH blacks and NH whites. This result is congruent with prior studies that have found that the disparity between NH blacks and NH whites is not significantly altered when controlling for socioeconomic factors.[10,16,19] We believe that factors unavailable in the NHIS must explain the racial/ethnic disparity in vaccination between NH blacks and NH whites. For example, there may be attitudes, beliefs, and perceptions that influence how African-American adults, particularly the elderly, perceive and access vaccinations.[20] It has been suggested that African Americans who recall past violations in medical care and research ethics may be reluctant to seek care or receive vaccines, even when financial barriers are eliminated.[21] Moreover, racial/ethnic minorities who have experienced racial prejudice

Table 5. Crude and Adjusted Prevalence Odds Ratios for the Association Between Lack of Vaccination and Race/Ethnicity* Among Adults 65 Years and Older—1998 National Health Interview Survey

Logistic Models	Hispanics		NH Blacks	
	POR	95% CI	POR	95% CI
Crude model	1.89	(1.5 to 2.3)	2.24	(1.9 to 2.7)
Full model†,‡	1.27	(0.9 to 1.7)	2.00	(1.6 to 2.5)
Controlling for covariates‡	1.94	(1.6 to 2.4)	2.26	(1.9 to 2.7)
Controlling for all access variables†	1.27	(0.9 to 1.7)	1.96	(1.6 to 2.4)
Controlling for predisposing variables§	1.38	(1.1 to 1.8)	1.90	(1.6 to 2.3)
Controlling for enabling variables‖	1.53	(1.2 to 1.9)	2.10	(1.7 to 2.6)
Controlling for environmental/system variables¶	1.87	(1.5 to 2.3)	2.23	(1.9 to 2.7)
Controlling for need variables#	1.90	(1.6 to 2.4)	2.35	(1.9 to 2.8)
Controlling for predisposing,§ enabling,‖ need,# and covariates‡	1.27	0.9 to 1.7)	2.01	(1.6 to 2.5)
Controlling for predisposing,§ enabling,‖ and covariates‡	1.27	(0.9 to 1.7)	1.98	(1.6 to 2.5)
Controlling for predisposing,§ enabling‖ variables	1.26	(0.9 to 1.7)	1.93	(1.6 to 2.4)

**Non-Hispanic whites = reference group.*
†All access variables: age, gender, education, marital status, English language proficiency, recent immigrant, annual household income, insurance status, regular source for care, care delayed due to cost barrier, number of doctor's visits, difficulties obtaining appointments, telephone access difficulties, long waits at provider office, inconvenient clinic hours, transportation problems, health status, and chronic conditions.
‡Covariates: residence in a metropolitan statistical area (MSA), region of the country of residence.
§Predisposing variables: age, gender, education, marital status, English language proficiency, recent immigrant.
‖Enabling variables: annual household income, insurance status, regular source for care, care delayed due to cost barrier, number of doctor's visits.
¶Environmental/system variables: difficulties obtaining appointments, telephone access difficulties, long waits at provider office, inconvenient clinic hours, transportation problems.
#Need variables: health status, 1 or more chronic conditions.
POR, prevalence odds ratio.

often view the established medical care system with suspicion.[22,23]

The Institute of Medicine (IOM) issued a report in March 2002 highlighting the multiple causes of racial and ethnic disparities in health care.[24] This report summarized the many potential sources of health care disparities in 3 groups: 1) organization and operation of health care systems; 2) attitudes and behaviors of consumers of health services; and 3) providers' biases and prejudices. As a first step toward reducing disparities, the report recommends making both providers and patients aware of the extent of the disparities in health care. However, the report cautions that awareness of the problems is not enough and it needs to be supplemented with wide-ranging strategies aimed at modifying policies and practices of exiting health care systems. In addition, it emphasizes the need for cross-cultural training to help health care providers recognize how cultural and social factors influence health care.

One limitation of our study is that vaccination status was obtained by self-report and verification of the vaccination history was not possible. However, previous studies have shown self-report of vaccination status to be highly accurate.[25,26]

A second limitation of this study is the inability to examine vaccination status in relation to national origin within the Hispanic population. Several studies have found differences in utilization of health care services by nationality.[27] Overrepresenting elderly Cubans and Puerto Ricans may bias the results by selecting the Hispanic groups more likely to seek and receive care, but unfortunately the sample size was not large enough to conduct a subanalysis by national origin. Another potential limitation of this study is the absence of information in the NHIS regarding beliefs, behaviors, and attitudes of the population under study and their providers. Studies that can examine cultural, attitudinal, and ethnographic characteristics among African-American elderly are needed to better understand the determinants of the racial/ethnic disparity in influenza vaccination.

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